
Space Weather Forecast

Issued on Friday, 10 May 2024 at 00:29 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

Space Weather Forecast Headline: G2-G3 (Moderate to Strong) geomagnetic storm conditions expected late 10 May to 11 May with a chance of G4 (Severe) intervals and significantly enhanced auroral activity. Further Strong class flares (R3 - Strong radio blackouts) likely.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity is High with two strong flares observed from the large region in the southwest disc. Furthermore, occasional Moderate-flares were observed from this region and another in the far northwest. There are seven sunspot regions on the visible disc with two new regions in the northeast. The southwest sunspot group remains, by far, the largest and most active flaring region on the disc. Areal extent increased with consolidation of a number intermediate spots within the main penumbral regions and increase in total magnetic flux. The region remained extremely complex in its configuration. Accurate assessment of the region in the far northwest was increasingly difficult as it approached the limb, but there appeared to be a waning in size and complexity resulting in a slight reduction in classification. The remaining sunspots on the disc are smaller, more stable and magnetically simpler.

Two large Coronal Mass Ejections (CMEs) were observed leaving the sun on 09 May, associated with flares from the large and complex sunspot region in the southwest disc. The first of these, resulting from the strong flare peaking at 09/0913 UTC was particularly fast and expected to 'sweep up' the numerous CMEs from the 08 May into a combined arrival at Earth late on 10 May. Another CME was in evidence in solar imagery from the strong flare peaking at 09/1742 UTC. This is currently being assessed for any potential Earth-directed trajectory.

Solar Wind / Geomagnetic Activity: Solar winds were at slightly elevated levels throughout, declining from 470km/s to 400km/s as the connection to a coronal hole continued to ease. The Interplanetary Magnetic Field was at weak levels throughout with the important north-south component also varying weakly. Geomagnetic activity was Quiet to Unsettled (Kp 1-3).

Energetic Particles / Solar Radiation: Solar radiation was at near background levels, although indicated a slight response to recent flare activity.

Four-Day Space Weather Forecast Summary

Solar Activity: High solar activity is forecast with frequent Moderate flares expected and isolated Strong flares likely, principally from the large sunspot region located in the southwest of the visible disc.

Solar Wind / Geomagnetic Activity: Multiple Earth-directed CMEs were observed leaving the sun between 08 and 09 May associated with solar flares from the large and complex sunspot region in the southwest disc. Due to the relative speed of the various CMEs they are expected to combine into a single larger arrival towards the end of the UTC day on day 1 (10 May). Some glancing influence is also possible from another CME that left the northeast disc on 08 May, this signal likely to be swamped by the previously mentioned CMEs however. Another CME was in evidence in solar imagery from the strong flare of the large region in the southwest disc at

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

09/1742 UTC. This is currently being assessed for any potential Earth-directed trajectory.

Outside of CME influence slightly elevated solar winds are expected to fall to background levels on day 1 (10 May). A Coronal hole enhancement is possible from late day 2 (11 May) or early day 3 (12 May) onwards although may be masked by lingering CME effects, therefore confidence in observed peak speeds is low.

Geomagnetic activity is expected to remain Quiet to Unsettled early on day 1 (10 May). Later in the day effects from multiple Earth-directed CMEs, as a combined front, are expected to increase activity to G2-G3/Moderate to Strong levels, with a chance of G4/Severe Geomagnetic Storm intervals. Similar levels of activity should persist into the start of day 2 (11 May) before slowly declining towards more typical values by day 3 and 4 (12 and 13 May). Confidence at the end of the period is low and the forecast may change should further large Earth-directed CMEs occur.

Energetic Particles / Solar Radiation: There is an ongoing chance for a Minor Storm or greater solar radiation event occurring throughout the period, associated with significant solar flares from the two large sunspot groups in the western hemisphere of the visible disc.

Geomagnetic Storms:

Geo-Magnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	95	95	80	40
Strong	G3	No	60	60	30	10
Severe	G4	No	30	30	10	5
Extreme	G5	No	10	10	5	1

Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	Yes	95	95	95	95
Very Active	R3 to R5 X	Yes	60	50	50	50

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm ⁻² sr ⁻¹ s ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	40	40	25	25
Very Active	≥ S3 *	No	5	5	5	5

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = cm⁻²sr⁻¹s⁻¹)